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Press Release

BIUST to host radio-astronomy training facility for future mega telescope project

The Botswana International University of Science and Technology (BIUST) has been nominated by the Ministry of Infrastructure, Science and Technology (MIST) to host the Newton Fund Project on behalf of the Government of Botswana. This project will be hosted and managed by the Department of Physics and Astronomy and is going to be championed by Dr Mhlambululi Mafu. The main objective of the Newton Fund project to build science and engineering capacity in radio- astronomy in preparation for the Square Kilometer Array (SKA) project that will be implemented in Botswana in 2023.

The SKA will be the world's 'next generation' radio astronomy telescope. It will consist of multi-radio telescopes that will have a total collecting area of approximately one square kilometre. It will operate over a wide range of frequencies and its size will make it 50 times more sensitive and up to 10 000 faster (in terms of its survey speed) than the best radio telescopes of today. It is powerful enough to detect radio waves from objects that are millions or even billions of light years away from Earth. It will require very high performance central computing engines and long-haul links with a capacity greater than the current global internet traffic. It will be able to survey the sky more than ten thousand times faster than ever before.

The SKA will focus on addressing questions that can only be answered using a radio telescope. Scientists will use it to help understand how the Universe evolved, how stars and galaxies form and change, and what "dark matter" really is. Scientists expect that the SKA will make new discoveries that we can't even imagine now. They may even find life elsewhere in the Universe. The capabilities of the SKA will be designed to address a wide range of questions in astrophysics, fundamental physics, cosmology and practise astrophysics as well as extending the range of the observable universe.

Benefits of this project to Botswana are as follows: The technologies and systems required for the SKA will require engineers to work at the cutting edge of design and innovation, such as better high-performance computing and new manufacturing, and construction techniques. The most important spin-off, however, will be the generation of new knowledge and knowledge workers - young scientists and engineers with cutting edge skills and expertise in a wide range of scarce and innovative fields. Specifically, the SKA aims to:

- Build institutional capacity in universities, research institutions and government departments that promote the development of radio-astronomy programmes and initiatives;
- Develop a vibrant community of researchers and scientists to undertake radio-astronomy studies across Africa;
- Develop a pool of engineers, technicians and other associated skills to support the design, construction, operations and maintenance of radio astronomy telescopes and related platforms;
- Mobilise the funding and technical resources needed to realise Africa's vision for radio astronomy;
- Facilitate strategic partnerships and collaborative efforts, both regionally and globally; and
- Meet all the minimum regulatory and legal AVN and SKA requirements for the successful construction and operation of the AVN and SKA telescopes.

Many different countries are working together to build - and pay for - the SKA. Ten member countries are the cornerstone of the SKA and 100 organisations from 20 countries have participated

in the design and development of the SKA. World leading scientists and engineers are designing and developing a system which will require supercomputers faster than any in existence and network technology that will generate more data traffic than the entire Internet.

The core of the telescope is co-located in South Africa and Australia. However, there will be outlying stations that are going to be built in partner countries across Africa. Botswana is one of the eight (8) African countries that will partner in this SKA project. Although BIUST has been awarded the hosting rights by MIST, all universities, schools and other interested entities in Botswana will have access to this state-of-the-art facility. Through the Newton Fund project, each of the partner countries will be provided with two interferometers, a library and a cluster of 10 powerful computers to be funded by this grant. As such, BIUST will house this equipment as part of Botswana's first step towards its participation in the SKA Phase 2 project in 2023.

Thousands of SKA antenna dishes will be built in South Africa with outstations in other parts of South Africa, as well as in eight (8) African partner countries, namely Botswana, Ghana, Kenya, Madagascar, Mauritius, Mozambique, Namibia and Zambia. Another part of the telescope, the low-frequency array, will be built in Western Australia. The SKA will partly be used to answer questions which have not yet been asked. Radio astronomers will use the SKA to understand how stars and galaxies are formed, and how they evolved over time, and perhaps to detect life elsewhere in the Universe. Furthermore, the SKA will be used to obtain a better understanding of dark energy and dark matter.

Africa's share of the iconic SKA project means that the continent is set to become a sought-after science destination. Over the next decades, many top scientists and research scholars will come to do cutting-edge science. The SKA will collect and process vast amounts of data as well as stimulate cutting-edge advances in high-performance computing. Producing the thousands of dishes required for the SKA within the project's time scales will also demand an entirely new way of building highly sophisticated and sensitive scientific instruments - which should lead to innovations in manufacturing and construction. This mega-project is therefore an ideal platform to excite young people about a career in science, engineering and technology, and to deliver skills that will be in demand in the global knowledge economy of the future.

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